08-24-01

GAU- 2153

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**(Case No. 00-368-A)**

In the Application of:

**William B. Busa**

Serial No. **09/768,686**

Filing Date: **January 24, 2001**

For: **Method And System For Automated Inference Creation Of Physico-Chemical Interaction Knowledge From Databases Of Co-occurrence Data**

Examiner: **TBD**

Group Art Unit: **2153**

Commissioner for Patents
Washington, D.C. 20231

## TRANSMITTAL LETTER

1. We are transmitting herewith the attached papers for the above-identified new patent application:

   1) Information Disclosure Statement (IDS) Letter

   2) Information Disclosure Statement (IDS) 1449-Form (7 Sheets)

   3) Copies of IDS Citations (106 Citations)

   4) Return Postcard

2. A check in the amount of **$0.00** is enclosed for the Filing Fee.

3. **GENERAL AUTHORIZATION TO CHARGE OR CREDIT FEES:** Please charge any additional fees or credit overpayment to Deposit Account No. **13-2490**. A duplicate copy of this sheet is enclosed.

4. **CERTIFICATE OF MAILING BY "EXPRESS MAIL" UNDER 37 CFR § 1.10:** The undersigned hereby certifies that this Transmittal Letter and the papers, as described herein-above, are being deposited with the United States Postal Service with sufficient postage as "Express Mail Post Office to Addressee" in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on this **23rd** day of **August**, 2001. Express Mail No. **EL604652635US**.

By: Stephen Lesavich

**Stephen Lesavich**
**Reg. No. 43,749**

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE
CHICAGO, ILLINOIS 60606
TELEPHONE (312) 913-0001

PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**
**(Case No. 00-368-A)**

| | | |
|---|---|---|
| In the Application of: | ) | |
| | ) | |
| **William B. Busa** | ) | |
| | ) | Examiner: **TBD** |
| Serial No. **09/768,686** | ) | |
| | ) | |
| Filing Date: **January 24, 2001** | ) | Group Art Unit: **2153** |
| | ) | |
| For: **Method And System For Automated Inference Creation Of Physico-Chemical Interaction Knowledge From Databases Of Co-occurrence Data** | ) | |

**INFORMATION DISCLOSURE STATEMENT**

Commissioner for Patents
Washington, D.C. 20231-1111

Dear Sir:

Pursuant to the duty of disclosure provided by 35 C.F.R. § 1.56 and §§ 1.97-98, the applicants wish to make the following references of record in the above-identified application. Copies of the references are enclosed. Copies are also listed in the PTO-1449 form enclosed herewith. It is requested that the documents be given careful consideration and that they be cited of record in the prosecution history of the present application so that they will appear on the face of the patent issuing from the present application.

Portions of the reference may be material to the examination of the pending claims, however no such admission is intended. 37 C.F.R. 1.97 (h). The reference has not been reviewed in sufficient detail to make any other representation and, in particular, no representation is intended as to the relative importance of any portion of the reference. This Statement is not a representation that the cited reference has an effective date early enough to be "prior art" within the meaning of 35 U.S.C. sections 102 or 103.

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

OIPE
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
JC110

## CITED REFERENCES

### U.S. Patents

| Document Number | Date | Name | Class | Sub Class | Filing Date of App. |
|---|---|---|---|---|---|
| 5,021,220 | 06/04/1991 | Mertens | 424 | 1.1 | 08/17/1990 |
| 5,263,126 | 11/16/1993 | Chang | 395 | 51 | 09/10/1992 |
| 5,307,287 | 04/26/1994 | Cramer, III et al. | 364 | 496 | 06/17/1991 |
| 5,355,445 | 10/11/1994 | Shibao et al. | 395 | 54 | 04/08/1992 |
| 5,418,943 | 05/23/1995 | Borgida et al. | 395 | 600 | 10/23/1991 |
| 5,418,944 | 05/23/1995 | DiPace et al. | 395 | 600 | 01/23/1992 |
| 5,434,796 | 07/18/1995 | Weininger | 364 | 496 | 06/30/1993 |
| 5,511,186 | 04/23/1996 | Carhart et al. | 395 | 600 | 11/18/1992 |
| 5,615,112 | 03/25/1997 | Liu Sheng et al. | 395 | 615 | 01/29/1993 |
| 5,657,255 | 08/12/1997 | Fink et al. | 364 | 578 | 04/14/1995 |
| 5,742,811 | 04/21/1998 | Agrawal et al. | 395 | 606 | 10/10/1995 |
| 5,751,605 | 05/12/1998 | Hurst et al. | 364 | 496 | 08/15/1996 |
| 5,806,060 | 09/08/1998 | Borgida et al. | 707 | 3 | 04/23/1997 |
| 5,808,918 | 09/15/1998 | Fink et al. | 364 | 578 | 06/25/1997 |
| 5,809,499 | 09/15/1998 | Wong et al. | 707 | 6 | 10/18/1996 |
| 5,819,266 | 10/06/1998 | Agrawal et al. | 707 | 6 | 03/03/1995 |
| 5,857,185 | 01/05/1999 | Yamaura | 707 | 5 | 09/13/1996 |
| 5,862,514 | 01/19/1999 | Huse et al. | 702 | 22 | 12/06/1996 |
| 5,867,118 | 02/02/1999 | McCoy et al. | 342 | 90 | 06/07/1995 |
| 5,873,080 | 02/16/1999 | Coden et al. | 707 | 3 | 03/26/1997 |
| 5,873,083 | 02/16/1999 | Jones et al. | 707 | 4 | 10/03/1997 |
| 5,892,838 | 04/06/1999 | Brady | 382 | 115 | 06/11/1996 |
| 5,901,069 | 05/04/1999 | Agrafiotis et al. | 364 | 528.03 | 08/01/1997 |
| 5,914,891 | 06/22/1999 | McAdams et al. | 364 | 578 | 01/19/1996 |
| 5,940,817 | 08/17/1999 | Kishi et al. | 706 | 46 | 02/14/1992 |

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

OIPE
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
3610

| Document Number | Date | Name | Class | Sub Class | Filing Date of App. |
|---|---|---|---|---|---|
| 5,950,192 | 09/07/1999 | Moore et al. | 707 | 3 | 06/26/1997 |
| 5,965,352 | 10/12/1999 | Stoughton et al. | 435 | 4 | 05/08/1998 |
| 5,966,712 | 10/12/1999 | Sabatini et al. | 707 | 104 | 05/15/1997 |
| 5,970,482 | 10/19/1999 | Pham et al. | 706 | 16 | 02/12/1996 |
| 5,970,500 | 10/19/1999 | Sabatini et al. | 707 | 104 | 05/15/1997 |
| 5,977,890 | 11/02/1999 | Rigoutsos | 341 | 55 | 02/13/1998 |
| 5,978,804 | 11/02/1999 | Dietzman | 707 | 10 | 04/10/1997 |
| 5,980,096 | 11/09/1999 | Thalhammer-Reyero | 364 | 578 | 01/17/1995 |
| 6,023,659 | 02/08/2000 | Seilhamer et al. | 702 | 19 | 03/06/1997 |
| 6,073,138 | 06/06/2000 | de l'Etraz et al. | 707 | 104 | 02/08/1999 |
| 6,081,620 | 06/27/2000 | Anderholm | 382 | 194 | 08/17/1999 |

**Foreign Patents**

| Document Number | Date | Country | Class | Sub Class | Translation Yes/No |
|---|---|---|---|---|---|
| WO98/15825 | 04/16/1998 | PCT | G01N | 33/00 | |
| WO99/05323 | 02/04/1999 | PCT | C12Q | 1/68 | |

**Other Documents**

| Citation |
|---|
| Overbeek et al., "Representation of Function: The Next Step", Pub. On-line 01/31/97, www.mcs.anl.gov/compbio/publications/function_pap.html, pages 1-13. |
| Karp et al., "Representations of Metabolic Knowledge: Pathways", Artificial Intelligence Center, ISMB-94, pages 203-211. |
| Ogata et al., "KEGG: Kyoto Encyclopedia of Genes And Genomes", Institute for Chemical Research, Nucleic Acids Research, 1999, Vol. 27, No. 1, pages 29-34. |
| Heidtke et al., "BioSim – A New Qualitative Simulation Environment For Molecular Biology", Max-Planck-Institute For Molecular Genetics, ISMB-98, pages 85-94. |

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

OIPE
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
JC110

| Citation |
| --- |
| Igarashi et al., "Development Of A Cell Signaling Networks Database", Division of Chem-Bio Informations, National Institute Of Health Sciences, 1997, pages 187-197. |
| Goto et al., "Organizing And Computing Metabolic Pathway Data In Terms Of Binary Relations", Institute For Chemical Research, Kyoto University, 1997, pages 175-186. |
| Kraus et al., "Systems Analysis In Cell Biology: From The Phenomenological Description Towards A Computer Model Of The Intracellular Signal Transduction Network, Experientia 49 (1993) Birkhäuser Verlag, Ch-4010 Basel/Switzerland, pages 245-257. |
| Ogata et al., "Computation With The KEGG Pathway Database", Institute For Chemical Research, Kyoto University, BioSystems 47 (1998), pages 119-128. |
| Karp et al., "EcoCyc: Encyclopedia Of Escherichia Coli Genes And Metabolism", Nucleic Acids Research, 1998, Vol. 26, No. 1, pages 50-53. |
| Bono et al., "Reconstruction Of Amino Acid Biosynthesis Pathways From The Complete Genome Sequence", Institute For Chemical Research, Kyoto University, 1998 by Cold Spring Harbor Laboratory Press ISSN 1054-9803/98, pages 203-210. |
| Goto et al., "LIGAND Database For Enzymes, Compounds And Reactions", Institute For Chemical Research and Graduate School Of Agricultural Sciences, Kyoto University, 1999 Oxford University Press, Nucleic Acids Research, Vol. 27, No. 1, pages 377-379. |
| Goto et al., "LIGAND: Chemical Database For Enzyme Reactions", Institute For Chemical Research and Graduate School Of Agricultural Sciences, Kyoto University, Oxford University Press, Bioinformatics, Vol. 14, No. 7, 1998, pages 591-599. |
| Ermolaeva et al., "Data Management And Analysis For Gene Expression Arrays", Nature Genetics, Vol. 20, September 1998, pages 19-23. |
| McGregor et al., "Pharmacophore Fingerprinting. 1. Application To QSAR And Focused Library Design", Affymax Research Institute, J. Chem. Inf. Comput. Sci. 1999, 39, pages 569-574. |
| Collins et al., "Driving Drug Discovery And Patient Therapy Via The Encapsulation And Fusion Of Knowledge", Momentum Healthcare Ltd, Pharmaceutical Sciences Research Institute, Drug Design And Discovery, 1999, Vol. 16, pages 181-194. |
| Mark Collins, "Empiricism Strikes Back: Neural Networks In Biotechnology", Bio/Technology, Vol. 11, February 1993, pages 163-166. |
| Hopfinger et al., "Extraction Of Pharmacophore Information From High-Throughput Screens", Current Opinion In Biotechnology, 2000, 11, pages 97-103. |
| Peter A. Hunt, "QSAR Using 2D Descriptors And TRIPOS' SIMCA", NRC Terlings Park, Journal Of Computer-Aided Molecular Design, 1999, 13, pages 453-467. |
| Schmalhofer et al., "Cooperative Knowledge Evolution: A Construction-Integration Approach To Knowledge Discovery In Medicine", German Research Center For Artificial Intelligence, Methods Of Information In Medicine, 1998, 37, pages 491-500. |

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

OIPE
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
JC110

| Citation |
| --- |
| Mars et al., "Knowledge Acquisition And Verification Tools For Medical Expert Systems", Med Decis Making, 1987, 7, pages 6-11. |
| Robinson et al., "Self-Organizing Molecular Field Analysis: A Tool For Structure-Activity Studies", Physical And Theoretical Chemistry Laboratory, Oxford University, J. Med. Chem., 1999, 42, pages 573-583. |
| Sung et al., "Evolutionary Optimization In Quantitative Structure-Activity Relationship: An Application Of Genetic Neural Networks", Department of Chemistry, Harvard University, J. Med. Chem., 1996, 39, pages 1521-1530. |
| Hans Matter, "Selecting Optimally Diverse Compounds From Structure Databases: A Validation Study Of Two-Dimensional And Three-Dimensional Molecular Descriptors", J. Med. Chem., 1997, 40, pages 1219-1229. |
| A. David Rodrigues, "Preclinical Drug Metabolism In The Age Of High-Throughput Screening: An Industrial Perspective", Pharmaceutical Research, Vol. 14, No. 11, 1997, pages 1504-1510. |
| Gorse et al., "Molecular Diversity And Its Analysis", DDT Vol. 4, No. 6, June 1999, pages 257-264. |
| Cramer et al., "Prospective Identification Of Biologically Active Structures By Topomer Shape Similarity Searching", Tripos, Inc. and Bristol-Myers Squibb, J. Med. Chem., 1999, 42, pages 3919-3933. |
| Manallack et al., "Neural Networks In Drug Discovery: Have They Lived Up To Their Promise?", Eur. J. Med. Chem., 34, 1999, pages 195-208. |
| The Knowledge Access Suite – Much More Then Just Data Mining, www.datamining.com/ka-suite.htm (various other articles attached all accessed at dataming.com). |
| Data Mining: An Introduction: Clementine-Working With Health Care, www.spss.com/cool/papers/clem_healthcare1.htm (other various downloads from this site). |
| Cognos Scenario, www.cognos.com/scenario/index.html. |
| Discover New Drugs, Discover Synt:em, www.syntem.com. |
| "DIVA Desktop Decision Support For Life Sciences Research For Windows 95, Windows 98, Windows NT", Oxford Molecular, 1999, pages 1-4. |
| Oxford Molecular – Solutions For Discovery Research, www.oxmol.com/software/diamond/background.shtml (various other articles from this site). |
| MDL Information Systems, Inc., www.mdli.com/cgi/dynamic/product.html?uid=$uid&key=$key&id=40 (various other articles from this site). |
| Tripos, Inc. Discovery Research, www.tripos.com/research/typapp.html. (various other articles from this site). |
| "Bionumerik Pharmaceuticals", Red Herring Magazine, www.rhventure.com/mag/issue67/news-feature-du99-bionum.html, pages 1-2. |

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

O.I.P.E.
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
TC 1100

| Citation |
|---|
| "Chemistry And Biological Sciences", Silicon Graphics, Inc. (SGI), 2000, www.sgi.com/chembio/cust_success/bionumerik.html, pages 1-2. |
| "CS 267 Assignment One – Drug Design", garnet.berkeley.edu/~abeand/cs267/assignment1.html, pages 1-2. |
| "Cray And BioNumerik Pharmaceuticals: Engineering More Rapid Cures For Today's Diseases", www.cray.com/features/bionumerik.html, pages 1-3. |
| "BioNumerik Reports Preclinical Antitumor Data On Two Novel Supercomputer Engineered Anticancer Agents At 89th Annual AACR Conference", www.prostatecancer.com/otherinfo/story2-aacs.html-ssi, pages 1-3. |
| "Agile Business Rule Processing", The Haley Enterprise, Inc., 1999, pages 1-9. |
| "Knowledge Management And Knowledge Automation Systems", Gallagher Financial System, Inc., pages 1-6. |
| Various pages from www.haley.com/4013219860515857/0000025120WhitePapers.html, etc. |
| Arbour Group, Software Specialists To The Pharmaceutical And Medical Device Industries, www.arbourgroup.com, (various other articles from this site). |
| Nanodesign – Partners In Drug Discover, EMD Facts-Evolutionary Molecular Design, www.nanodesign.com/EMD_facts.htm, (various other articles from this site). |
| BIOREASON – Automated Reasoning Systems For Drug Discovery, www.bioreason.com, (various other articles from this site). |
| Next Generation Software Tools For Early Drug Development, www.innaphase.com/pub/products.htm, (various other articles from this site). |
| LION Bioscience – Genomics, Informatics, Solutions, ww.lion-ag.de, (various other articles from this site). |
| Inpharmatica – World-Class Bioinformatics, www.inpharmatica.co.uk, (various other articles from this site). |
| "Project Explorer: Enabling Knowledge-Led R& D Projects", Synomics, www.synomocs.com/m/products/projectexplorer.htm, pages 1-3. |
| PharMatrix – Providing Information, Knowledge & Project Management Solutions For Pharmaceutical Discovery & Development, www.base4.com, (various other articles from this site). |
| Rowe et al., "Artificial Intelligence In Pharmaceutical Product Formulation: Neural Computing And Emerging Technologies", PSTT Vol. 1, No.5, August 1998, pages 200-205. |
| Rowe et al., "Artificial Intelligence In Pharmaceutical product Formulation: Knowledge-Based And Expert Systems", PSTT Vol. 1, No. 4, July 1998, pages 153-159. |
| Wayne C. Guida, "Software For Structure-Based Drug Design", Current Opinion In Structural Biology, 1994, 4: 777-781. |

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001

OIPE
AUG 2 3 2001
PATENT & TRADEMARK OFFICE
JC110

| Citation |
|---|
| Bioinformatics, Pharmaceutical Informatics And Drug Discovery", www.basefour.com/what_is.html, pages 1-3. |
| Commercial Bioinformatics Software, www.uk.embnet.org/data/www/CCP11/commercial_software.txt.html, pages 1-12. |
| Hwa A. Lim, "Bioinformatics And Cheminformatics In The Drug Discovery Cycle", in:Lecture Notes In Computer Science #1278, 1997, pages 30-43. |
| Nathan Goodman, "The Fundamental Principles For Constructing A Successful Biological Laboratory Informatics System", pages 1-11. |
| Rebecca N. Lawrence, "Enhancing Information Sharing", DDT Vol. 4, No. 11, November 1999, pages 494-495. |
| Matthew Thorne, "InfoTech Pharma '98: Managing The Knowledge", DDT Vol. 3, No. 5, May 1998, pages 197-199. |
| Quinn et al., "Development Of Internet-Based Multimedia Applications", TiBS 24, August 1999, pages 1-4. |
| Watt et al., "Approaches To Higher-Throughput Pharmacokinetics (HTPK) In Drug Discovery", DDT Vol. 5, No. 1, January 2000, pages 17-24. |
| Craw et al., "Automated Knowledge Refinement For Rule-Based Formulation Expert System", PSTT Vol. 2, No. 9, September 1999, pages 383-385. |
| Steve Bottomley, "Bioinformatics – Value-added Databases", DDT. Vol. 4, No. 1, January 1999, pages 42-44, DDT. Vol. 4, No. 10, October 1999, pages 482-484. |
| Andrade et al., "Bioinformatics: From Genome Data To Biological Knowledge", Current Opinion In Biotechnology 1997, 8, pages 675-683. |
| Profiles Monitor, various articles, DDT. Vol. 3, No. 11, November 1998, pages 525-527. |
| Monitor, various articles, DDT Vol. 3, No. 9, September 1998, pages 426-428. |
| Peter Murray-Rust, "Bioinformatics And Drug Discovery", Current Opinion In Biotechnology, 1994, 5:648-653. |

Respectfully submitted,

**McDonnell, Boehnen, Hulbert & Berghoff**

Date: August 23, 2001

By: Stephen Lesavich

**Stephen Lesavich**
**Reg. No. 43,749**

McDONNELL BOEHNEN
HULBERT & BERGHOFF
300 SOUTH WACKER DRIVE,
SUITE 3200
CHICAGO, IL 60606
(312) 913-0001